THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY.

Publishing Office, No. 42 Pine Street.

Devoted to the Interests of Illumination, Heating, Ventilation and Sanitary Improvement, Domestic Economy, and General Science.

VOLUME XIV.—No. 11. WHOLE No. 244. | NEW YORK, FRIDAY, JUNE 2, 1871. | $3 PER ANNUM IN ADVANCE.

Coal Dust as Fuel.

[Owing to the kindness of Professor PHIN, Editor of our valued exchange, the *Technologist*, we are enabled to present, in illustration of this subject, a fine cut of CRAMPTON'S feed and jet arrangements.—H. W.]

"The employment of coal dust as fuel is now attracting a great deal of attention, not only on account of the actual superiority of this method of combustion in some respects, but because it enables us to utilize an otherwise worthless article. The idea is by no means a novel one, a patent for this method of consuming fuel having been taken out in England as long ago as 1831."

[John S. Dawes—Dec. 22d, 1831. In the "Manufacture of Iron, the fuel and materials are driven into the furnace with the blast." We may also quote a subsequent patent, April 16th, 1840, of S. M. Banks, "conveying into the blast furnace coal or coke, or charcoal, limestone, ironstone, ore, or other material useful for accelerating the process of manufacture or improving the quality of the iron, by reducing the said materials to fine particles and causing them to fall into the blast pipe, and so meet the blast and be carried with it into the furnace." Many of us will remember that when the plans of WHELPLY and STORER, based on this principle, were promulgated a few years since, there was a very general impression that the principle was novel, and then first put in practice.—H. W.]

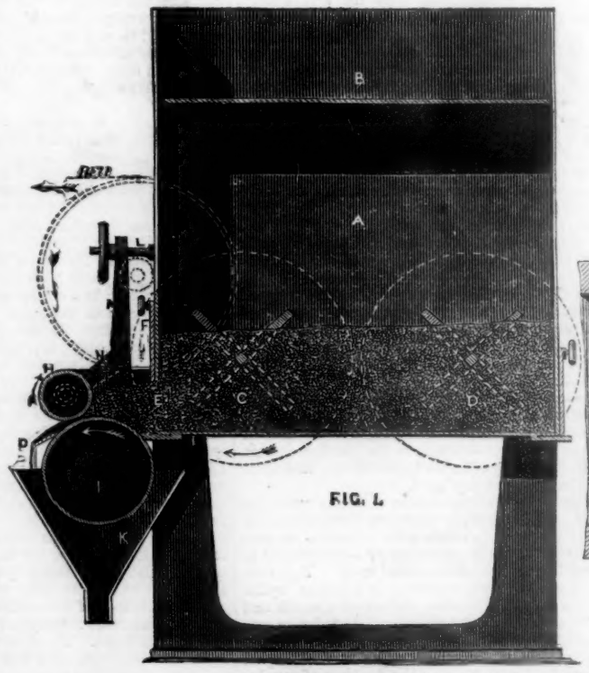

FIG. 1.

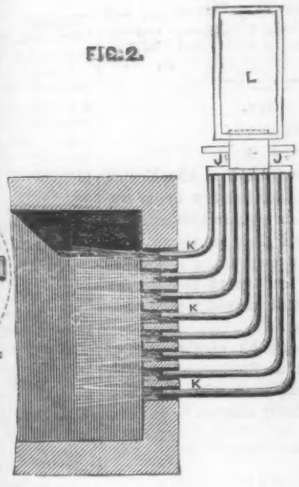

FIG. 2.

CRAMPTON'S COAL DUST FURNACE.

"Coal dust, particularly if it is in a slightly damp state, is by no means an easy thing to feed into a furnace regularly; but, after trials of several arrangements, Mr. Crampton has designed and adopted a very simple apparatus for the purpose which answers its purpose perfectly. It is represented by the annexed diagram, Fig. 1, and consists of a hopper fitted with a pair of smooth feeding rolls, as shown. The hopper, A, in which the powdered coal is placed, is fitted with a strainer, B, to prevent the entrance of large particles, and it is traversed by two revolving shafts; these shafts carrying stirrers, C, D, which keep the coal dust in a loosened state. These stirrers revolve in the direction of the arrows, and thus force the powdered fuel through the opening, E, the extent of which is regulated by the sliding door, F. The opening, E, leads to the box, G, and the upper edge of the opening is kept below the top of the box so that the fuel is not forced over the latter. If the box becomes full of fuel from the fact of the rollers not taking it away so quickly as it is supplied through the opening, E, the stirrers, C, D, not having force enough to increase the height of the fuel in the box, G, will, as they revolve, merely agitate the fuel until the rollers have reduced the quantity in the box. From the box, G, the fuel passes between the rollers, H, I, which feed into the shoot, K, leading to the injector. The quantity of fuel fed by the rollers is regulated by means of a screw, L, which acts on the lever, M, and thence on the lever, N, to which are attached the bearings of the roller, H; this arrangement enabling the distance between the rollers to be modified as desired. As the rollers withdraw the fuel from the box, G, it is replenished by the action of the stirrers; the effect being that the fuel in the box, G, is maintained in a comparatively loose state, and furnishes a steady and uniform supply to the rollers, quite independent of the depth of the fuel contained in the hopper, A. The rollers, it will be noticed, are fully exposed to view, so that any irregularity in the supply passing over the scraper, O, can be readily detected. The fuel passing down the shoot, K, falls in a fine stream just in front of a jet, or series of jets, of air which inject it into the pipe or pipes leading to the furnace. As an instance of the perfection of the arrangements just described, it may be mentioned that at Woolwich fifty consecutive heats have been turned out from Mr. Crampton's furnace—each heat averaging 30 cwt. of blooms—without the handles by which the supplies of air and coal regulated ever having been touched.

In discharging the jets of mixed air and coal dust into the furace, it is essential that their direction should be such that an unequal distribution of the coal dust in the air, which may have been caused during its passage through the pipes, shall be remedied. Thus it is found that when the mixed air and coal dust is carried round a bend in a pipe, the momentum of the particles of coal will cause them, on entering the bend, to be carried against the outer side of the latter. If, after passing the bend, the air and coal dust traverse a long straight length of pipe, they may get perfectly mixed again; but, if they are discharged into a furnace directly after leaving a bend, it will be found that one side of the jet (that corresponding to the outside of the bend) will be overcharged with fuel, while the other side will be undercharged. If no means were taken to remedy this, the effect of igniting such a jet would be imperfect combustion; but Mr. Crampton has ingeniously converted this separating action into account to effect in some cases a perfect admixture of the air and fuel. Thus in a heating furnace constructed on his plans, which is now at work at Woolwich Arsenal, the arrangement of jets adopted is that shown in the figure annexed. In this case it will be seen that the jets are placed in a row, side by side, the pipes leading to them being all curved in the same direction; and the effect of this is that the overcharged portion of one jet is delivered into the undercharged portion of the next, and so on, a perfect mixture of the air and coal dust being thus obtained."—*Engineering.*

Chemical Repertory.

No. 54.—June 2, 1871.

EDITOR—HENRY WURTZ.

MR. EDGERTON'S REPORT.

We owe an apology to this gentleman, whose important Photometic Table, etc., must go over to our next issue.—H. W.

CHEMICAL EXCERPTA.

13. "*Ozokerite.*" As our scientific contemporaries are passing around an item from *Engineering* upon this mineral product, it may be well to set the public right thereupon. *Ozocerite* (odorous wax) instead of having been "discovered some two years since by a Russian engineer," as *Engineering* promulgates, is a familiar species in cabinets since 1833, and has long been made into candles, in the countries where it is found, one of which is the United States. Ozocerite is nothing more, or less, or other, than mineral paraffine, which is an abundant natural product concomitant with our Pennsylvania petroleums.

It was first discovered as a mineral species in 1833, in Moldavia, by VON MEYER, and is known throughout the German countries quite familiarly as "*Erdwachs*" (earthwax.) Even its occurrence in the Caspian region is by no means a novel announcement. QUENSTEDT in his *Mineralogie*, p. 648, under *Ozokeeit*, speaks of it from the island Tschiliken in the Caspian. Its composition approaches carbon 85 hydrogen 15, which appears to indicate (if it belongs to the saturated hydrocarbons, as the most eminent of living chemists, BERTHELOT, appears to have proven, or what he calls the "formene" or marsh gas series, of the generic or molecular formula $C^n H^{(n+2)}$) somewhere about the composition $C^{34} H^{36}$, which corresponds exactly to this. It must be remarked that BERTHELOT's examination of American paraffines by his method of synthesis by hydrogenation, gave him a molecule much more highly condensed than this, namely $C^{30} H^{32}$, calling for the centesimal composition carbon 85.04, hydrogen 14.96. An analysis of Galician ozocerite, by HOFSTAEDTER, is cited by DANA, in his last edition (p. 732) which gave carbon 84.94 hydrogen 14.87. All paraffines, however, both natural and artificial, are evidently mixtures of compounds of typical composition, which may vary within small centesimal limits.

H. W.

Water Meters.

(Concluded from page 148.)

An invention of Mr. Worthington's, of the United States, consists in an arrangement of two cylinders, each containing two plungers or pistons connected by a single rod, bearing a central division plate. The valves are placed between the containing cylinders, and the alternate spaces are connected by crossway passages, from one into the other of which the water flows before it leaves the meter.

The chief object aimed at by the combination of several cylinders is a continuous discharge from the meter, and the prevention of any concussion occurring in the pipes. This is so perfectly effected by Messrs. Chadwick's meter, that any additional complication and expense, such as these machines involve, is quite needless.

Another American method uses a cork piston or ram, packed with cupped feathers; and a Mr. Heppel furnishes a solid wooden cylinder, with an annular leather bag, and causes it to work loosely in a cylindrical casing. These have their advantages in cheapness and absence of friction, but their adaptability in continual contact with the water is very questionable. The best form of piston for a water meter appears to be a cylinder of metal with a flange at each end, the intervening space being long enough to allow the travel of a ring of india-rubber up and down during each stroke of the piston.

There is yet another combination of pistons and cylinders which has been devised for measuring water. The inventor places a number of cylinders round a central shaft free to revolve, and attaches the heads of their piston rods to the corners of an inclined plate centred on the central shaft; the pressure of the water against their pistons causes them to rotate, and their revolutions open and close their respective valves. They may also be placed along a common trough or pipe, and their piston rods in gear with a common crank shaft. They are free to oscillate, and, in doing so, valves at their junction with the main pipe are alternately open to each side of a central partition in it, which divides outlet from inlet.

The next description of positive meters includes all which are constructed to work with flexible or elastic diaphragms. The principle of these meters is, that a perfectly water-tight partition shall be formed, capable of assimilating itself to either end of a containing chamber, its edges being firmly bedded in the sides of the chamber, so that water admitted on either side alternately will force the diaphragm tight against the other. The shape of the chambers used to enclose these diaphragms is generally those of a double sector, or a sphere, or with inclined sides and flat ends. The chambers are most usually broad and shallow, and made of two shaped plates bolted firmly together, with the diaphragm between them. This is made of leather or vulcanized india-rubber, toughened by layers of calico or prepared cloth. It is generally strengthened by a central plate of metal, to which a piston-rod is attached, which passes out of the chamber and actuates the valves.

In one patented by Mr. Ramsbottom, in 1855, there are two diaphragms in doubly conical chambers, the rods of which turn a common crank shaft. On this are two mitre wheels, which turn a rotary valve between them.

In a German meter, the rod actuates a lever with a chordal rack attached to the further end. This gears with a pinion, a crank on whose shaft moves the valves.

In another meter, four diaphragms are used at right angles, and all driving the same central shaft by means of cranks. From this shaft the registry is taken, and it is made to distribute through valves the supply of water to each pair in turn.

Meters of these descriptions will work with great accuracy, whilst the diaphragm remains entire. But it has been found impossible to discover any material which will endure active work with certainty; and, as soon as the smallest flaw occurs, water passes without registry.

Closely allied to meters of this description, are those whose measuring chambers are made of compressible bags or cylinders. One of the simpler forms of these was patented in 1850. It consists of a water-tight chamber, containing two compressible cylinders, distended with metal rings at intervals. Their upper ends rise and fall vertically as they fill and empty, raising and lowering each end of a bar with them. Chains from these ends pass over separate pulleys, and are attached to the ends of a cross handle of a four way cock. Another design fastens two such cylinders end to end on a rocking arm passing right through them. They rise and fall as they alternately increase and loose weight, and alter valves seated at their point of connection.

Compressible tubes have also been often suggested as water meters; for use as such, they are wrapped round a centre cylindrical core, or coiled in a ring on a circular plate, and a pair or more of rollers, revolving round a shaft placed in the centre of the bag, and pressing tight against it, are caused to move by the pressure of the water entering one end of the bag, and forcing the rollers before it, in order to escape at the other extremity. By the time one roller has arrived at the end of the bag, a second comes into play; thus a series of waves of equal and known amount are continually passing through the bag, and being registered by the central shaft. An invention of Mr. Siemens makes use of a similar principle, by causing waves of liquid to pass down a tube of rectangular section, between the sides and a flexible central division. To all such meters the same objection holds as in the case of the diaphragm meter—that they are most uncertain in duration, especially if liable to stand idle, and their flexible portions to get dry hard.

An entirely different description of meter are those which work on the principle of rotary force pumps or fans. They are usually made with cylinders or axes revolving either in the same centre or eccentrically in outer cylindrical casings with closed ends. The simplest form is that of a plate sliding in a hollow cylindrical shaft or an elliptical disc, sliding on a crank and revolving in an epicycloidal chamber, the inlet on one side, the outlet on the other. The fluid continues to flow and the ends of the plate or disc cut off equal quantities of fluid, and register the number of revolutions. Or the centre cylinder may be concentric with the outer casing, and have one or more flat vanes of metal let into slots in its periphery, which are forced into it at a certain part of its revolution, between the inlet and outlet holes, by a bulge or indent in the outer shell, causing the periphers of the inner cylinder to revolve in close contact with it, and forcing out the water included between any of the vanes. These vanes are carefully packed and must revolve in close contact with the outer circle, and for the purpose of always keeping them tight against this, a cam is placed inside the inner hollow cylinder, which forces them out at all parts sufficiently.

A French invention proposes to shut up air in the inner cylinder, and trusts to its compression and expansion to keep them in gear.

According to another, an eccentric axle is fixed inside the inner cylinder with four short arms; on to these are hinged the travelling vanes, which at a certain part of the revolution, where required, bend at the hinges and recede, and afterwards again straighten and are forced forwards.

In these machines the accurate fitting and easy travel of the vanes is of great importance; but however carefully this may be carried out originally, from constant use these machines soon give signs of wearing, and neglect to register accurately.

Some inventors make use of oscillating vanes or pistons swinging round in hollow cylinders from one side to the other of a fixed partition, the inlet and outlet being on each side and reversible by valves; and even more complicated arrangements of two or more swinging vanes, sometimes in adjoining cylinders, and other equally impracticable machines have been proposed.

A great many adopt the method of hinged vanes or floats, capable of laying close alongside their centre spindle, and of spreading out against the encasing cylinder under pressure of water. After the principle of the fan, the vanes are made concave against the pressure of the water, and are hinged on to a cylinder, so made to revolve eccentrically, that just before it reaches the inlet opening, the blades are folded closely down, but on passing it they spread, and do not again close until they have passed the outlet.

Different arrangements of two cogged wheels, rolling in contact, have also been suggested; they are made of considerable breadth, and are placed in a double cylindrical casing, the one riding loose, the other fixed on a shaft which actuates the register. The teeth of such wheels must be very carefully made, in order to continue in contact at every instant of their revolution, the water being usually supplied immediately under the point of contact. It will be easily understood that the efficiency of the machine depends entirely on the fitting of the gearing surfaces of the wheels, and which equally applies to the preceding description of meters, to the careful packing at each end of the drums. A meter which has not come into public use, but which has been found to work satisfactorily, when applied to measure the water supplied to steam boilers, consists of a string of ball fitting accurately in a loop formed in the supplying pipe, and, passing over a pulley at each end, the water enters on one side of one pulley, and, carrying the string of balls before it, passes out at the other extremity. These balls cause the pulleys to revolve, and show how much water has passed.

Amongst inferential meters, which depend for their accuracy on their estimate of the velocity of the water passing through them, those which register the revolutions of annular rings of metal, fitted with floats or paddles round its periphery, are most numerous; the water in this case being admitted through apertures, as nearly as possible at right angles to the surface of the floats, impinges against them and causes revolution in a very irregular proportion to the speed and pressure of the water. An invention of Mr. Ramsbottom's has been used to some extent, and consists of a wheel with radial floats. Another machine, by Mr. Taylor, is very similar. He uses a horizontal wheel, provided round the periphery with radial floats, and riding on a vertical spindle in a closed chamber. It is to be made of any material of the same specific gravity as water, in order to reduce friction on the bearings, and is driven by the water admitted through small holes close to the wheel. This meter has been used considerably in the North of England, but it found much inferior in correctness and power of discharge to others.

To insure an even flow, which was the only condition under which these meters would work accurately, and to prevent low pressure water from passing at all, several different methods have been devised. By one arrangement, the water is required to raise a clack-valve, held down to its seat by a delicate spring, before it can impinge against the drum; by another, the water is caused to pass through a contracted elastic orifice; and by a third means, the flow of water in its action on the drum is regulated by a specially designed governor.

The next class of inference meters include all those which register the rotation of drums with screw blades fixed round them. These drums are fitted into long cylindrical casings, and the water flows past them, having been first directed through fixed guides turning in the opposite direction, and causing it to impinge on the drum blades at nearly right angles. An earlier invention of Mr. Siemens is of this description, who uses two drums, or two pairs of drums, turning in opposite directions, and set end to end in the same tube. The drums are made hollow, of a peculiar alloy, and have eight perfect screw threads passed round each. The registration is taken off the central ends of the drum shaft by means of mitre wheels, and there are directing guides equal in number, but exactly opposite in direction between each.

A patentee of 1851 places a similar drum, but rather longer, on a valve seating in a vertical pipe; it is thus rendered capable of lifting before any impurity which may be carried along with the water. Some others use a great many serics of drums and guides, and occasionally choose to admit the water without guides simply between two reversed drums on the same spindle. The accuracy of these machines depends largely on the careful fitting and balancing of the drums, and

their continuing to work without friction; but even under the most favorable circumstances, they will not register with sufficient correctness at varying pressures, and rising above the real amount at moderately high ones.

A further improvement has been suggested and used by Mr. Siemens and others, on the principle of a Barker's mill, whereby the water is admitted into the interior of a chamber fixed on a spindle, out of which it flows by means of bent or curved hollow arms; the reaction of the outflowing liquid (for the vessel is entirely under water) causes it to rotate in an opposite direction; the spindle moves on a steel pivot encased in a water-tight oil chamber; the water is admitted through a dirt box; the revolving chamber is furnished with retarding vanes, and the upper end of the shaft has a worm wheel attached, which works the register.

The above meter has found most favor before the public, both in England and abroad, of all the meters yet introduced; but notwithstanding its superiority it possesses many defects. It is expensive, and is not by any means certainly correct under all pressures; it is, besides, so very delicate, that it continually requires inspection and repair. It will pass water through at low pressures with a very insufficient registry, and will work backwards without difficulty.

A great step in the removal of all the above defects, both in this and every other meter yet introduced, is exemplified in an invention by Messrs. Cook and Watson, a meter which has only lately come before the public notice. It consists of an upper plate, indented on the under side with a ring of thumb holes, and riding loosely in a chamber over a lower plate, through which inclined inlet holes are bored. The water rises through these holes, raises the upper disc, and acting against the square ends of the thumb holes, causes it to rotate at the same time. This action of course requires some small power to commence, but as soon as the upper plate is lifted it must also necessarily rotate. When the supply ceases the upper plate falls, and forms a tight valve against the return of the water; and since during its period of revolution this plate floats in a film of incoming water, there are no wearing surfaces involved in the machine. Small stays are placed on the upper surface of the revolving plate, in order to produce regularity of motion under varying pressures, and appear, from the specimens I have at different times been enabled to test, to do so with complete success.

These machines are not expensive, and offer but small opposition to the flow of the liquid, and certainly appear to be the simplest and most practicable form of high pressure meter yet invented.

A very different description of inferential meter consists in the use of a rod of alabaster, or other slowly soluble material, encased in a glass rod graduated, and at its lower end in contact with the running water. It is kept pressed down, and as it dissolves, the top descends and is supposed to denote the quantity of water which has passed. This seems very simple, but the readings must often be liable to considerable variation.

New Gasometer for the Cambridge Gas Company.

The Cambridge Gas Company a short time since purchased five acres of marsh land on the line of Court street, on the Cambridgeport side, and are erecting thereon an immense gasometer. An excavation has been made by Mr. Robert Ross, the contractor, to the depth of twenty-five feet. The first ten feet was through sand and light gravel, and the last fifteen feet has been cut through a splendid bed of clay. The workmen were troubled at first by the tide, but gutters are now provided around the side of the basin, some twelve feet from the upper surface; these conduct the water to a trench, from which it is pumped up by a steam engine, which is kept at work day and night. The building is to be of brick, the height to be fifty feet, with a diameter of 106 feet, and the holder will have a capacity of 210,000 cubic feet of gas. A 16-inch main will be laid from the building to Cambridgeport, up Broadway, and a 12-inch main will conduct the gas through Court street to East Cambridge. The cost of the new structure will be $60,000, exclusive of street work.

The Rondout and Kingston Gas Works, located at Rondout, had a narrow escape from destruction on the night of the 13th inst., by the burning of a barn adjacent to a gasholder containing 50,000 feet of gas. The distance between the barn and the holder was about 12 or 15 feet, and lying between the two were ten barrels of coal tar, which, fortunately, did not become ignited, although the fire was so hot as to heat the iron of the holder facing the fire, nearly to a red heat. Fears had heretofore prevailed in regard to fire in the barn, and the gas superintendent had to some extent taken precautions against the disastrous consequences possible from such an accident.

A Novel Gas Cut Off in Case of Fire, or Fire Acting Gas Valve.

Patented April 25, 1871.

When buildings which are lighted with gas take fire, it frequently occurs that the gas cannot be shut off on account of the heat, or the key is not to be found, or the cock is so corroded that it cannot be turned etc., when the meter connections melt and large quantities of gas flow into the burning building, aggravating the conflagration, and entailing a heavy loss on the gas manufacturer.

The object of this invention is to automatically arrest the flow of gas, when the heat in the burning building is about 170 deg. Fah.

It consists of the ordinary gas fittings, T, and plug, with a round iron ball, put together as in Fig. 1.

Fig. 1 represents the plug, P, with a cavity, C, in the mouth of which is a round iron ball, B, held by means of gas fitters cement, or other suitable substance; the plug being heated, the cavity of which is to be filled with cement; the ball being also heated is laid on the cement, which when cooled stick fast together, and remain so until heated or removed by force; the plug is then screwed into T, as shown in

Fig. 2.

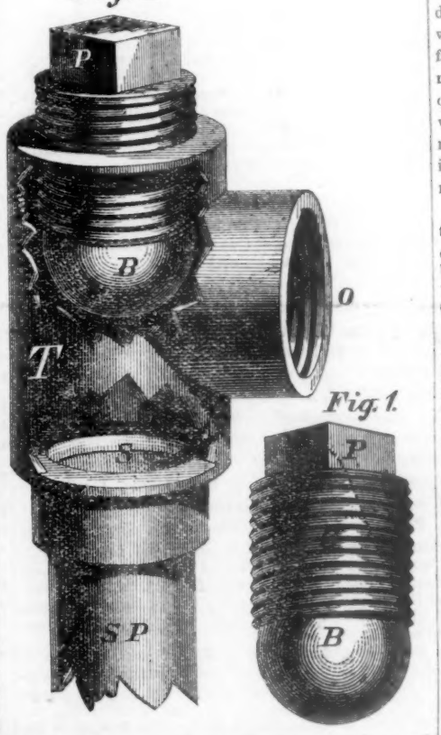

Fig. 1.

Fig. 2, which represents the apparatus complete, and attached to the service pipe, S P; the T as shown at S is milled or bored out, so as to form a seat for the ball. As the T's are sold a good seat is formed by the shoulder at S, but to be perfect it should be made true.

The ball being held by the cement directly over its seat, and confined as it is by the T, it is evident that on the application of heat the ball must go to its seat, and the cement dropping on and around the ball seals the joint and effectually shuts off the gas.

In case it is desirable to change the relative positions of service pipe, S P, plug P, and outlet to meter, O, from what is shown in Fig. 2, the plug and ball work just as well at the side at O, and the outlet to meter be taken from the top or bottom; also the service pipe may be attached to top, bottom, or side; if it is desirable to extend the service pipe to other meters, a cross may be used instead of a T.

It is an open question with some gas companies, whether to use a service cock outside of buildings or not; some companies using them and others not. Now whether a service cock is used or not, the extreme low cost of this valve will, I think, cause it to be generally adopted, as for instance where a T and Plug is necessarily used—which is very common—the whole extra cost is only the round ball, a bit of cement, and the milling out the T.

For information, rights, etc., address,

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[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Eds.

The New "Friction Condenser."

New York, May 24, 1871.

Messrs. Editors: My attention has been called to a very novel idea of a condenser for the treatment of illuminating gas, made from bituminous coals. It is called St. John and Rockwell's Patent Friction Condenser or Dry Scrubber. Having duly examined the drawings or plates, published in your Journal of May 2d, 1871, I have come to the conclusion that this scrubber embraces many principles that must arrest the attention of gas manufacturers.

1st—I consider in particular, the hydraulic seal to the whole volume of the gas, where there is an exhauster employed, to be of the most importance in arresting a very large quantity of tar existing in the volume of gas after leaving the hydraulic main, for it is found that the bulk of the tar that proceeds from the coal, in the destructive distillation, is found in the hydraulic main, simply for the reason that it is in its warmest possible condition as it occurs in the manufacture of gas, upon reaching this point, and of course more easily arrested by coming in contact with the liquid, or admixture of ammoniacal liquor and tar, which give the gas a friction or partial washing, but not sufficient to arrest all, as the seal of the dip-pipes is reduced as low as possible, in order to relieve the retorts of pressure.

There are differences of opinion existing in relation to this, but I belong to those who cannot see that the exhauster is of importance beyond this primary point, but only in relieving the main of its gas and pressure, which gives the gas generated in the retorts a more free and easy delivery.

As there is no discussion as yet upon this condenser or dry scrubber, and as I am an investigator in this particular field, to which much of my labor is directed, I do not consider that I should content myself by merely stating observations and facts. It is the business of the investigator to let those who labor with him have the benefit of his thoughts and conclusions, as well as a fair statement of his facts. Such thoughts, even though they be founded on misapprehension, rarely fail to help the cause of progress and of truth, for though it is possible for them to be wrong in themselves, they still impart interest to the subject, set others to thinking, and often suggest what is right.

This seal may present some objections where there is no exhauster employed, by elevating the back pressure; but if an exhauster is necessary in any case, then it must be of decided advantage; being composed chiefly of ammoniacal liquor, it acts with energy upon the tar in the volume of gas, and not being dissimilar in its nature from the gas like water, does not attack the light hydrocarbons and extract them, but leaves them to go forward with the gas; which must certainly increase its quantity, as well as improve its illuminating power. This seal would seem to destroy the necessity of repumping the ammoniacal liquor up to the top of the scrubbers, and employing it in washing the gas in place of water, as they have done in London and other cities of Europe, where the manufacture of gas is a much older institution. Their experience has proved, that the use of water has ever had a tendency to weaken or reduce the illuminating power of the gas. I have seen in my experience, gas made from the best cannel coals, which should certainly give an 18-candle gas if properly treated, reduced to 12-candles, and this was produced by excessive washing with water (no scrubber being employed.) This seal is in a compartment by itself, and is so constructed, that the tar, which being the heaviest body settles to the bottom, is drawn off by a self-acting siphon, so that the seal is ever in the ammoniacal liquor, which allows the gas to pass through it with less pressure. It is thus passed into the first series of pipes, where it sustains friction at pleasure, by the lattice work. This, being adjustable, gives the control of the scrubber to the operator outside, and the regulation of the friction necessary is entirely in his hands: the pressure gauges are his guide, and it seems that this ingenious application has a great merit in itself, for at the same time that it divides the volume of gas into several thin sheets, it presents ten to twelve additional surfaces for action; also giving it as many changes in its course as there are blades. This counteraction of cross currents introduces considerable friction at this point, which breaks up the last vestiges of any small *globules* or *bubbles* of gas in

combination with tar, ammoniacal liquor, etc., that may exist; precipitating the tar, etc., and setting the vapors free. This lattice work is also easily removed, sliding in its position upon grooves, and attached to a plate secured to the pipe by tap bolts, thus can be taken out easily, if any repairs should ever be needed.

After the gas passes between the surfaces of this lattice work, it meets with corrugated plates in sections above, which occupy the intervening space of the sections above and below each other. This arrangement, as in case of the lattice work, divides the gas into so many surfaces for action, that it must perform its part with the latter to a very great extent; as well as in keeping the gas, or the tarry matter, warmer than it otherwise would be if it made its ascent in one volume, which causes it to be more easily arrested. The corrugated covers are also very effective, as the gas is subjected in all its parts to their action. It would seem impossible for any tar to pass through this condenser or scrubber.

Having had some conversation with the inventors, they state that the front elevation does not represent the scrubber complete, but only one half; that is to say, there will be constructed sixteen pipes of twelve feet rise and fall—giving 192 feet, and the covers, etc., additional; which would make about 260 feet for the gas to flow before it passes out, after entering the scrubber; and at every foot of it the gas is continually changing its internal or intestinal form, and at the same time new surfaces are constantly presented. This scrubber seems to embrace from beginning to end many valuable principles, and suggests the idea that gas can be made without washing. There has been some doubt existing upon this point; but there are gas manufactories in Europe as well as in this country, and if I am credibly informed, one at South Boston, where it is accomplished with a continuous line of round pipe; but it appears to me that this would not be so well adapted to different volumes or quantities of gas; as the same amount of friction could not at all times be introduced. This is a very important advantage which ST. JOHN and ROCKWELL'S scrubber has, for by opening or closing the lattice work this is accomplished at once. There can be no possible error committed; the pressure gauges attached to the inlet and outlet of the scrubber tell the whole story. I have seen the gas, which amounted to 1,500,000 feet daily, thoroughly cleaned of its tar, upon 1.5-10 in. difference of pressure between the exhauster and the purifiers, the scrubbers being located between them; and the same difference of pressure would not remove tar in an increased volume.

Now, here is the important point which this scrubber embraces. By working the horizontal bar, the lattice work is made to conform to any circumstances that would arise in the manufactory; for the difference in the quantity of gas made by some gas companies, from mid winter to summer, is about one half. Then I would say, that the conditions are furnished to meet any and all emergencies arising out of the increase and decrease of the quantity of gas made throughout the year.

Next to sulphur, I believe tar to be the most troublesome foe to be subdued in the manufacturing of gas. Sometimes I have seen it deposited in the purifiers from very slight causes, and when it makes its appearance there it causes much trouble, for no matter what method of purification is employed it is all the same. Sometimes this is caused by the imperfect working of the condenser and scrubbers, and also by extreme cold weather. My experience has led me to believe that there should be an amount of friction at all times present, corresponding in a measure to the temperature of the atmosphere surrounding; for as the weather becomes cold the tar is harder to extract, and at these times the friction should be increased in the same proportion. Clegg has laid it down that gas should not be brought below 57 deg. to 60 deg. Fahr., on account of loss of its illuminating power.

On several occasions when the troublesome *black beast* was present in the purifiers, I have seen the temperature of the gas brought down gradually from 76 deg. to 45 deg., and the tar constantly on the increase, which argues that it requires something besides lower temperature to remove it. And I have also seen upon this occasion the introduction of friction, and the temperature of the gas brought back to its point of 76 degrees, at the same time the tar entirely disappearing, much to my relief. This would appear that the word condensation, produced by reduction of temperature, is somewhat arbitrary so far as this is concerned. As a rule, aqueous matter from chemical affinity tends to become solid, as seriform matter by the same law has a tendency to become fluid; this may have something to do with the word condensation in this case.

Distillation consists essentially in converting a liquid into vapor in a close vessel, by means of heat, and then conveying the vapor into another cool vessel, where it is condensed again into a liquid; but the destructive distillation of coal seems to present special circumstances, for no gas manufacturer wishes to reconvert his vapor into a solid; but it is of great importance to him to retain all of the vapor he can; also in the best possible condition, for it is upon this depends much of his success. The best article is always the most sought for, and it is the spirit of the age in which we live to excel if we possibly can.

As I have reviewed this scrubber in all its bearings, I have arrived at the conclusion that it has many decided advantages over the various forms of condensers and scrubbers employed, and that it must work its way upon its merits into public favor at an early day, for it appears to be what has long been sought for—an apparatus that will effectually remove all objectionable matter from the gas, without the introduction of any foreign matter, water, etc.; and that will protect, in a measure, the gas from becoming chilled, as in some cases, which makes the tar a very stubborn unyielding ingredient to extract; for my experience proves to me that the nearer the tar approaches the freezing point, the harder it becomes.

I would also refer to the hydraulic seal again. This seal is so arranged, that it can be, by the syphon, removed or destroyed at once. This could be done in a moment; for instance, if the exhauster had occasionally to be stopped for repairs, the seal might be dispensed with, and the lattice work could be made to furnish or supply any deficiency; at the same time allowing the gas to pass on, without much increase of back pressure. Accidents occur in the best regulated families, and there are many circumstances over which we have no control. It appears that the inventors have given the matter a very careful study, for in my review I find no objection presented, but what is accompanied with conditions and appliances to meet and adjust any difficulty therefrom apparent.

I will now bring this to a close, and in so doing, cannot well do so without according to the new and improved scrubber of ST. JOHN and ROCKWELL, all of the conditions and improvements necessary for the arresting of the tar and carbonaceous bodies, without abstracting from the volume of gas any of its volatile and light hydrocarbons; also while thereby increasing its quantity and illuminating power, lessening the usual labor attendant upon the purification.

INVESTIGATOR.

[Written Expressly for this Journal.]

Peat Charcoal and the Mixed Fuel of Peat and Coal Dust.

BOSTON, May 26, 1871.

Messrs. Editors: I believe it is generally considered that charcoal of wood is our purest and best fuel, and therefore of especial value for metallurgical and other purposes in the arts.

It is claimed, however, for the charcoal of *peat*, that its qualities are such as to demand for it a superior place on the scale, and this too, on the accumulated testimony of authorities which few would venture to question. Without going into details, I will give briefly a few points concerning it.

Peat may be charred either in pits, heaps, kilns, or retorts, and the process is much the same as with wood. The yield of charcoal from ordinary uncondensed peat, is generally only from 20 to 30 per cent. of the weight of the dry peat, and is, for most industrial purposes, quite too light and friable to be used to advantage.

From manufactured or *condensed* peat, however, a coke or charcoal is prepared, which is admirably adapted for the more severe processes required in the arts. It is of great strength, and of density exceeding the best wood charcoal, and is fully equal to that of the best coke made from coal.

The quantity generally obtained from a good article of *condensed* peat is from 35 to 42 per cent. of its weight. Its calorific power is *intense*.

Prof. Johnson, of Yale College, says: "When peat is charred it yields a coal or coke which, being richer in carbon, is capable of giving a more intense heat than peat itself; in the same way that charcoal emits a more intense heat than the wood from which it is made. A peat which is dense as the result of proper mechanical treatment and slow drying, yields very homogeneous and compact coal, superior to any wood charcoal, the best qualities weighing nearly twice as much per bushel."

The methods of charring pursued in England, Ireland, France, Bohemia, Bavaria, Saxony, Russia, Friesland and elsewhere, differ somewhat in details, but the general principles involved are the same. In all these places its value is recognized and appreciated. As early as 1851 the matter had enlisted a good deal of attention, and at the great exhibition of that year, numerous specimens of peat and peat charcoal, prepared by different processes, were exhibited, which were stated to be remarkable for their density and cheapness, and attracted particular notice from metal workers and others interested in the use of fuels.

In France and Prussia large quantities are produced and used not only in the arts but for household purposes, for all which it is highly esteemed. The ordinary yield by the method of charring in France is about 40 per cent of coke, which sells readily at the rate of 100 francs and upwards for 2,200 pounds, or about five times the price of the fuel in its uncharred condition, which fact may indicate pretty clearly the estimation in which it is there held. It is said to be of great value in the making of fine cutlery.

A correspondent in England, who has produced considerable quantities, states that it is readily sold at 50s. to 60s. per ton, while the cost of production is less than 20s. per ton, and that the best firms in Sheffield, Birmingham and the surrounding districts, would be glad to avail themselves of it if it could be had in quantity to meet their requirements, which is not at present the case.

The high heating power of this charcoal, and its freedom from properties deleterious to metals, appear to have invested it with peculiar interest to the smelter, and those who succeed him in the working of his products. Its chemical properties are also of acknowledged importance.

Of *mixed fuel*, composed of *coal dust and peat*, to which as also to peat-charcoal, allusion was made by a valued correspondent quoted in my last letter, I have, in past years, had some experience, brief reference to which may perhaps be of interest to some. On communicating with him concerning it he replies: "One of the most economical points you have mentioned is that of mixing mine and wharf dust of *bituminous* coal with peat; it was an object of my own trials and devices, and I know its great value. The inherent moisture ot the peat dilutes the vapors forming smoke when bituminous coal is consumed, and enables us to have a smokeless fire, in which the coal affords *one third more heat* than if burned in its normal condition, or in lumps and fragments."

I have twice prepared considerable quantities of this mixed fuel, sufficient for experiments of a character to test it severely. Most of these experiments were made on the Boston and Albany Railroad, on that section of it west of Chester, requiring the most severe service of any spot in New England, perhaps of any in the country, except the Alleghany regions and the mining districts of Pennsylvania, the grade being about 83 ft. to the mile, and the whole ascent within a distance of 12 miles being 950 feet, with several short and some double curves. Several trips were made with it on freight trains over this 12 miles, and brief report of a single one will illustrate its merits.

Train consisted of 11 freight cars, 3 of them loaded, which is equal to 14 empty cars—a heavy train for this grade. Started with sixty pounds steam. Nine minutes after starting the steam had run up to 140, and we had to open the furnace door. Twice we pumped cold water into the boiler, once with both pumps, when the steam fell 10 pounds from 130 to 120, but in five minutes was up again to 130. Had we been burning wood and used both pumps in the same manner as in this case, the steam would have run down 60 to 70 pounds; so said the engineer. The furnace door was open nearly four-fifths of the time. When we had used just 1000 pounds of the fuel, we found we had made seven miles in thirty minutes, having passed the heaviest grade and the worst curves; steam still standing at 130. We then commenced using wood and ran the remaining five miles with that. Steam soon fell to 120 and we were unable to raise it above that point. The first seven miles, by far the hardest portion of the route, was run in 30 minutes with the mixed fuel; while the remaining five miles with wood took 45 minutes.

The engineer was astonished and delighted; said it was decidedly the best fuel for making steam he had ever used, and expressed the opinion that a half tun would take an ordinary passenger train from Chester to Pittsfield (24 miles). including the long and high grade before mentioned; or that a ton of it would take a passenger train over a common grade road 100 miles, and that a tender would carry four tons of it.

These experiments, it is true, were not made as a comparison with *coal*, but the opinion expressed in the most decided terms by the engineer, who was a man of long and varied experience, was that for severe steam service it was far superior to *either* wood or coal. Combustion appeared to be almost perfect; there was no caking of the fuel, and it made but very little smoke. The heat was clear, steady and extremely intense.

It will burn in almost any fire box of either wood or coal-burning engines; though if it were to come into common use, we should doubtless have fire boxes specially adapted for it, and a little experience would demonstrate the best and most economical method of using it. The exhaust pipes should be larger than for hard wood.

It is believed that the method adopted for the manufacture of this mixed fuel may be adapted, by simple modifications, to the smelting of various kinds of ores; also to the desulphurizing of ores in the most perfect manner. The ores and flux to be crushed and mixed with the peat in ascertained proportions, and the whole to be manufactured together in the form of fuel, with which the furnace is charged at pleasure. The results obtained from experiments on a small scale, are such as seem to indicate that a very superior product of metal may be so obtained, at comparatively small cost

For the purpose of gas companies, this method of mixing and preparing fuels would seem to have some very important advantages. It is well known that most companies use two or more kinds or qualities of coal for generating gas, the poorer and cheaper kinds for volume, and the richer and more expensive for body or strength. As shown in former letters, numerous experiments, some on an extended scale and long continued, have clearly developed the fact that peat has a very considerable value for gas purposes, the volume being larger, while the strength or illuminating power is believed to be above the average of coals; and it is by no means improbable that the point of perfection as to quantity and quality, might be economically attained by a proper mixture of peat and coal, after the manner described.

Doubtless, still other uses of the same principle may in time be discovered; but enough is already demonstrated to claim for it an important place in connection with the subject of *cheap fuel*.

There are many other matters in connection with this subject, of which it would be interesting to treat; my engagements, however, are such as to render it impracticable for me to continue my letters with regularity, though I shall hope to write occasionally.

Very respectfully,

T. H. Leavitt.

A Correspondent's View of Dip-Pipes.

Milwaukee, May 3, 1871.

Messrs. Editors: Through the columns of your valuable journal, our attention has been repeatedly called of late to what some of your correspondents are pleased to call, the importance of working retorts without a seal on the dip-pipe. I have read their remarks carefully, and studied their various patented devices for effecting this purpose, but thus far have not been able to see the vast improvements that are said to be effected by them.

About six months ago this matter was brought before us by a circular, reciting the advantages to be derived from the use of a certain valve, viz., increased yield, better quality of gas, etc., etc., and asserting that if we would not avail ourselves of these great improvements, the parties owning them would start opposition works, so that at least a *grateful public* might reap the benefit bestowed upon them by this philanthropic inventor. I would not be understood as underating any device that has for its object the removal of pressure from retorts, during the process of distillation. Fifteen years ago we arranged the tar pipe from the bottom of our hydraulic main in such a manner, that it could be raised or lowered to give the minimum seal required to resist the pressure caused by condensers, purifiers and holder. By this arrangement I found that no heavy tar settled in the bottom of the main, and that the liquid in it consisted of light tar and water. I have also found that gas passing a main in this condition, required very little washing to remove all traces of ammonia, and when I have been making 200,000 cubic feet per diem, I have used no washer or water in contact with the gas, but what was taken up by the lime in its preparation for the purifiers; and even with using dry coal I am satisfied that I have sufficient water for the removal of all ammonia from the gas; at least a very delicate test when applied shows no traces of its presence. But I do not wonder at the improvements made in some works by dispensing with dip-pipes, for I have repeatedly seen works that have been running for ten and twelve years, without their main being cleaned once, and I have found (if Mr. Keeling has not) the dip-pipes sealed with six and seven inches of *heavy tar*. What I am most surprised at is, that any individual having a practical knowledge of the manufacture of coal gas, should bother their brains with such devices as valves on their stand pipes, for the purpose of removing a very *small portion* of the pressure from the retorts, when if their pressure is five inches four and a half of it can be removed by the use of an exhauster, whereas the half inch can only be removed by the valve on the dip-pipe, and an exhauster will pay for its use in the smallest works in the country. So convinced am I of this fact, that it is proposed to erect no more works without them; and further, I know that working clay retorts at the temperature to give the best results, valves of any kind in the stand or dip-pipes cannot be used. I have repeatedly had to use a sharp instrument to remove the tr from the dip and stand pipes.

I notice in your issue of May 2nd, two devises from our esteemed friend Douty, of Columbus, Ohio, and am glad that his good sense has led him to substitute the hydraulic for the ground valve. I am satisfied that a little time will modify his views as to its utility at all, especially when he uses an exhauster.

Mr. Keeling, in the conclusion of his communication, says that he thinks "something might be substituted for the hydraulic main stand-pipes, etc., in their present condition," to save the risk of damage to mouth-pieces and joints. I send you a photograph of a stack we have in operation here and at several other works, showing an arrangement for carrying the main without its resting on the stack. The brackets rest on a solid foundation, and the level of the main is not affected by expansion or contraction of the arches. This arrangement I copied from plans by the late Neilson, engineer of the Greenock Gas Works, Scotland. With it, and leaving your stand-pipes half an inch clear of the bottom of the hub on the mouth-pieces, there is no danger from any strain on your retorts. We do hope that no one will take the hint from Mr. Keeling, and attempt anything simpler than the present simple arrangements of stand-pipes and main. We notice also, in the same number, illustrations of what appears to us a somewhat complicated machine, designated a friction condenser, or dry scrubber. Its condensing powers we doubt, where the gas does not come in direct contact with surfaces whose temperature is not reduced below that of the gas by either air or water; as to its scrubbing properties we can speak from experfence, having used one somewhat similar during the last year. Mine has no movable slats, and it is horizontal instead of vertical; it is simply a purifier box 10 x 3 x 2 feet 6 inches deep, filled with slats 6 inch by ½ inch,, secured in frames at an angle of 45 degrees, which stand vertically in the box, the whole forming a series of zigzag passages, half inch wide, through which the gas passes the whole length of the box.

I am pleased to see that such a man as Mr. St. John has turned his attention to a means of removing the tar held in mechanical suspension by the gas, other than the now common practice of deluging it with torrents of water.

Are we ever going to have a convention to talk over matters of interest to the fraternity? I see no reason why we cannot have one as well as the superintendents of gas works in other countries.

Out West.

Answer to John Keeling.

Messrs Editors: Your correspondent, John Keeling, gas engineer, in his communication of April 20th., which appeared in the Journal May 2nd., very freely expresses his opinions concerning the views advanced by other correspondents in their communications on the subject of the influence exerted by the dip-pipe in the manufacture of gas from coal, but he fails to show that the fact stated is not worthy of careful consideration, or to present any new light upon what takes place in the retort during the elimination of gas from coal, notwithsanding that "practical experience of over twenty years."

Your correspondents, "W" "X" and "Y," if I rightly understand their meaning, assume it to be a fact that by dispensing with dip-pipes, as provided for by the Gibson arrangement, the deposits of hard carbon, which forms more or less in all gas retorts, is avoided; and, that from an equal quantity of coal a greater quantity of gas of equal quality can thereby be produced, or an equal quantity of gas of greater illuminating power. Such is stated to be a fact by those who have had experience in its use. If Mr. Keeling is prepared to deny the truth of the statement he should give substantial reasons for such denial. But he does not show that he is thus prepared, or that he has ever made use of the so-called "Gibson Improvement," or put himself in the way of observing the results obtained from its use where it has been adopted.

If Mr. Keeling's object in his communications is to obtain notoriety, I have nothing further to say; but if it be, as I trust it is, to impart knowledge to his readers he should certainly first put himself in the way to obtain it.

As regards the originality of the device, which he so unsparingly condemns, it would be quite out of place in the limited columns of your Journal to attempt either to prove or disprove it. We are well aware that the disadvantages of the dip-pipe seal have been appreciated by intelligent and experienced gas engineers in various countries, perhaps more especially in England, and that there have been numerous devices, from time to time brought forward as substitutes for it, which from one cause or another have not found favor. We all know that the dip-pipe seal is still in general—almost universal use; and, in all probability, it will continue to be in use not only until, but long after experience has demonstrated that there is a way by which it is practicable and profitable to dispense with it.

It is not my purpose to show that the Gibson plan is practicable and the best method yet devised for accomplishing this purpose; but certainly it is no proof to the contrary, to show that it has not yet been adopted by this gas light company, or that gas light company, or any number of such companies. No one questions the value of the exhauster in gas works, yet it was long after its introduction in England before it was used in this country, and even now its application is not general if we take into account all the gas works which are in operation.

Mr. Keeling is "free to admit that were it possible to get rid of the accumulation of hard carbon in clay retorts, it would be a great gain." "But" he says, "it is not possible by any such contrivance." Will he inform us how he knows this and why he makes such an assertion? Has he ever tried it, and if so, under what circumstances, and with what retorts? He says, "It is a fallacy to suppose this substance that forms in clay retorts, is so much power and quantity taken from the gas, when in reality it is created by the high heat used in working clay retorts, from the heavy hydrocarbons, or tarry vapor, which at a lower heat would pass off as liquid tar and ammoniacal liquor. This is clearly demonstrated by the non-formation in the iron retort." Does he not know that simply passing a current of pure olefiant gas, or of coal gas, thoroughly refrigerated, through a porcelain tube, having the same degree of heat as is ordinary with working gas retorts, will occasion decomposition to take place, that solid carbon will be deposited within the tube, and that the gas as it passes out will have lost its illuminating power? And does he mean to have his readers infer that his twenty years experience has taught him that such decomposition does not take place in iron retorts, when it is well known that it is the chief cause of the destruction of iron retorts from the increased heat which it makes it necessary to be used in all gas works where the retorts are of iron? And will Mr. Keeling tells us though he "cannot endorse this alteration" (that is the Gibson Improvement) what the "something" is which he thinks "might be substituted for the hydraulic main, stand pipes, etc."

As regards the practical objections which Mr. Keeling sets forth they are purely imaginary, and quite sufficient to show that he has no experience in the use of the contrivance, which he does not hesitate to condemn.

J. H. B.

Clay Retorts.

Lockport, Westmoreland Co., Pa.

May 18, 1871.

Messrs. Editors: To confirm what Mr. F. J. Uhlrich, superintendent Gas Company Galena, Illinois gives as his experience of Clay Retorts versus Iron, and at the same time show that the clay retorts he has been using are not the only ones that can be worked to advantage, either with or without an exhauster, permit us to give the names of a few of the works who are using our clay retorts, and what the superintendents and engineers say of them; and here let us make a few remarks about the material from which we manufacture. Our clay is known as the "Bolivar," and by a careful analysis at your office, proves to be peculiarly adapted to the building of retorts. Gas engineers who have used the "Belgian" retort extensively, after a trial prefer ours, and say they are more *durable* and less liable to *carbonize*.

G. Douty, Esq., superintendent, Columbus, Ohio, after using our retorts for five years, says they *carbonize less* than the Belgian At Columbus they have no exhauster. The superintendent of the Cincinnati works says, "They are the best retorts they ever had." Thomas Pratt, Esq., Engineer, St. Louis, Mo., "I consider them the best retort made." R. Young, Esq., Superintendent, Alleghany, "I prefer them to any I have ever tried."

We could go on enumerating almost indefinitely, but not wishing to occupy too much of your valuable space, will conclude by informing gas engineers and others interested, that we are supplying most of the works West and South.

Respectfully,

Wilson & Gardner,
Clay Retort Manufacturers,
Lockport, Westmoreland Co., Pa.

Gas Meters.

Terre Haute, Ind., May 6, 1871.

Messrs. Editors: I was glad to see that Superintendent Somerville, of Knoxville, repelled the charge in your issue of the 17th ult., in reference to superintendents of gas works making a mystery of the meter and its operations; nor can I see the point of your disclaimer in the issue of the 2nd instant, where you state "your correspondent is evidently laboring under a wrong impression."

After reading the words referred to in a "careful manner," I cannot come to any other conclusion. Let us examine the article. After speaking of the meter and its admirable adaptation to the purpose it is intended to serve; alluding to the common practice of many intelligent persons of grumbling about the accuracy of the meter, when if the same was spent in a careful examination of the principle and mec'

of these useful instruments there would be fewer complaints"; after stating that the writer would "show what a meter has to do, and *how* it performs its duties," (although to our mind the *how* does not loom up very prominently) and mentioning the further fact, "that *when the process is understood*, then what is going on inside a meter is as present to the eye of the mind, as its external parts are visible to the bodily eye, and is therefore no mystery," it winds up with these significant words, "while *those* who ought to have taken the most pains (Who? superintendents of gas companies and the officers of the same?) to make the principles and merits of meters known, *have shown the greatest unwillingness to do so.*" Ah! there's the rub. These few last words are the unkindest cut of all. Who are those who ought to have taken the most pains to make the principle and merits of the meter known? Certainly not the consumer, for they are the parties who need instruction, therefore it must mean the company—through its official organs—the superintendant or officers, as it is a well known fact that few but the superintendant, and sometimes he also, has but a moderate knowledge of the internal construction and the scientific principles involved in the operation of the meter.

I can heartily say amen to and endorse the words of Mr. S. "If there are any gas men who work in such ways that are dark as you seem to think, they work against their own interests; for the best customers I have are those who understand the meter, *because* it is to the interests of both parties that they should do so."

To show that we have left no means untried for instructing the public as to the merits and operation, and the method of ascertaining that the meter is thoroughly correct, the writer of that article can turn to page 323 of the Journal, vol. 7, No. 21, under date of May 2, 1866, and he will find a communication on the "Unreasonable Prejudices Against Gas Companies." It has some typographical errors, and one line was left out, yet in the main it gives a fair description of the method of testing, and the perfect reliability of gas meters.

R.

TO INVENTORS AND PATENTEES.

This Journal, circulating, as it does, throughout the United States, Canadas, and portions of Europe, is a superior medium for advertising.

We also take out Patents in the United States and Europe, obtain Extensions, and make a *Specialty* of difficult and abandoned cases.

A. M. CALLENDER & CO.,
No. 42 Pine street, New York.

RECENT AMERICAN PATENTS.

Pertaining to the Specialties of this Journal, for the two weeks ending May 20th, 1871.

114,275.—Dry Gas Purifier.—Edward Duffee, assignor to American Gas Screen Manufacturing Company, Haverhill, Mass.

114,316.—Carburetter for Air and Gas.—Louis A. Marks, San Francisco, Cal.

114,399.—Protector for Gas or Vapor Burners.—Rufus Nutting, Randolph, Vt.

114,358.—Gas Machine.—Warren A. Simonds, Boston, Mass.

114,389.—Self Lighting Lamp.—William H. Batchelder, Boston, Mass.

111,415.—Water Meter.—Joseph W. Cremin, New York city, assignor of one-half his right to George H. Fairchild, Bridgport, Conn.

114,419.—Water Meter with Stop Cock Connections.—Jose F. De Navarro, New York city.

114,744.—Apparatus for Carburetting Hydrogen Gas.—Jacob Ambuhl, Morristown, Pa.

114,763.—Coal Screen.—Elbridge G. Belknap, Philadelphia, Pa.

114,873.—Enameling Gas Retorts, etc.—Decius W. Clark, Chicago, Ill.

114,776.—Purifying Water for Use in Steam Boilers, etc.,—G. C. Louis Degenherdt, Williamsburg, N. Y.

114,862.—Still for Hydrocarbons.—Jno. Gracie, assignor to Lockhart, Frew & Co., Pittsburg, Pa.

114,804.—Automatic Water Valve.—Joseph Guild, Buffalo, N. Y.

114,872.—Gas Retort.—Jas. H. Smith, Newark, Ohio.

114,904.—Water and Drain Pipe.—Thomas J. Barron, Brooklyn, N. Y.

114,950.—Apparatus for Igniting Gas and other Lights.—Wilhelm Klinkerfues, Gottingen, Prussia.

A RARE CHANCE FOR GAS MEN.

FOR SALE.—A COAL GAS WORKS, SITUATE IN A growing and thriving Southern city, now being rapidly developed by railroads. There is a good brick building sufficiently large for Retort Room, Purifying Room, Office and Meter Room. Present consumption from 90,000 to 120,000 feet per month. In the hands of an expert it can be made to yield a handsome income. Can be had on easy terms.

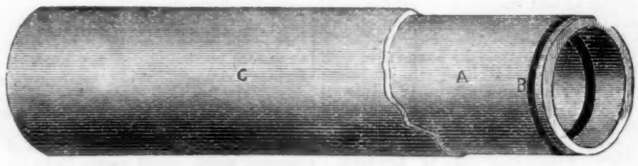
Further particulars can be had by addressing the Editor of this Journal. 241-tf

NORTHWESTERN
GAS AND WATER PIPE COMPANY.

WORKS AT BAY CITY, MICHIGAN.

CHICAGO OFFICE, 41 REYNOLDS BLOCK.

SECTION OF GAS PIPE.



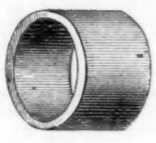


Fig. 2.

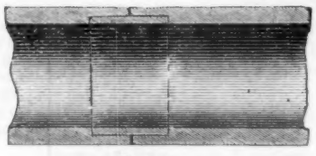


Fig. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

Fig. 2.—Thimble for Connection. Fig. 3.—Horizontal Section and Connection.

Above is a cut of the

"WYCKOFF PATENT IMPERISHABLE GAS PIPE,"

manufactured by the Northwestern Gas and Water Pipe Company.

This Pipe is made of White Pine, one inch to twelve inches bore, in sections eight feet long, rounded in a lathe, coated inside and out with Asphaltum, connected with a tenor, or socket, and a thimble joint, perfectly air and water tight, being driven together with cement furnished by the Company. When laid its cost is about one half that of Iron Pipe, and is unquestionably the best Gas conducting Main in use.

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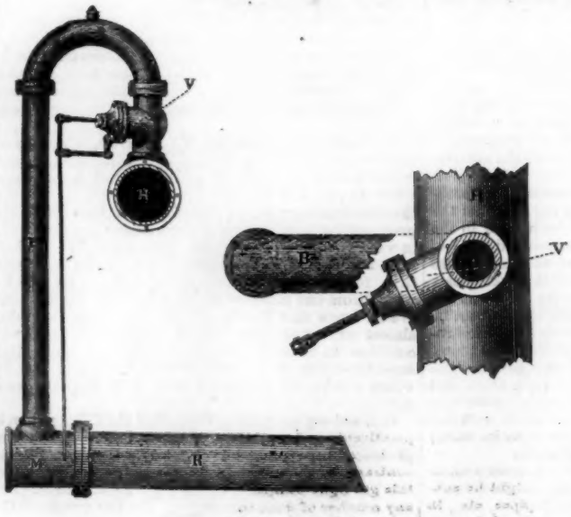
GIBSON IMPROVEMENT



In the manufacture of Coal Gas by means of which Dip-Pipes are dispensed with, the deposit of Carbon in the Retorts prevented, and a very large saving is effected.

Licenses for its use will be granted; also the parts necessary will be supplied to order, on application at their office,

No. 79 Water street, Boston, or
No. 41 Pine street, Room 1, New York.

R Retort.

M Mouth-piece.

P Stand-pipe.

B Bridge-pipe.

H Hydraulic main.

V Valve-substitute for Dip-pipe.

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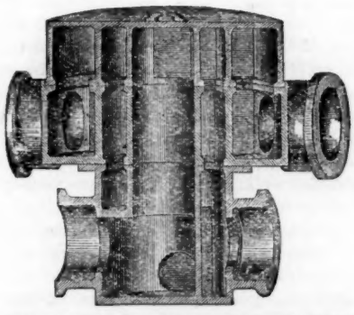

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Prof. HENRY WURTZ, Editor Chemical Department GAS-LIGHT JOURNAL.
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HERRING & FLOYD, Oregon Iron Foundry, 738 Greenwich Street, N. Y.
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CONSULTING CHEMIST, GEOLOGIST AND GENERAL SCIENTIST—
PROFESSOR HENRY WURTZ.

[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

FRIDAY, JUNE 2, 1871.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subject to which its colums are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

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General Editorials.

WINONA UNDER GAS LIGHT.

In view of the importance of the gas-light enterprise, our readers will be pleased to learn that Winona (Minn.) took a view of herself under gas light, for the first time, on Monday evening May 8th. The street lamps glistened brilliantly and cheerfully along the avenues, and many of the stores and private residences were resplendent with the blaze of the new illuminant. The gas is a success from the start. The flame, however, was not as it will be when the air is out of the mains, and when the works have been in operation for a few weeks, but still the light was good and remarkably clear for the first time it had been lighted. When this and other little trifles are remedied, the citizens of Winona will soon fall into the full enjoyment of that great modern revolution—gas.

The ordinance for a gas company was passed by the City Council on the first of August 1870. The incorporators were: T. E. Bennett, E. D. Williams, Thomas Wilson, A. W. Webster, Wm. Mitchell and Thomas Simpson, with a capital stock of $60,000. The officers are as follows: President, E. D. Williams; Vice President, T. Simpson; Secretary and Treasurer, T. E. Bennet. Mr. J. H. Jones is at present acting Secretary and Treasurer. Mr. Jas. Russell is to be Superintendent of the works.

Mr. J. H. Walker, Superintendent of the Milwaukee gas works was appointed engineer of the works. He furnished plans and specifications, purchased material and took the general superintendence of the construction of the works. Under his able direction everything has been performed to the entire satisfaction and pleasure of the company, who look upon their work with a feeling of just pride, believing them to be as good as any works in the country.

The works were commenced on the 16th of August, 1870, and would have been completed and in running order by the 1st of December, but for the failure of the parties who contracted to deliver the main pipes at the time agreed upon. The building is of brick 31x67 and built in a substantial style. The gasholder was built by Richard Davis, of the Marine Boiler Works, Milwaukee, and is said to be first class in every respect. The castings and most of the apparatus were made by the late firm of Goodrich & Hill, Milwaukee, now Blanchard & Arnold. The dry centre valve was also made by Goodrich and Hill. The station meter and consumer's meters are by the well known firm of Harris & Bro. of Philadelphia. These meters are all proved by a machine which has been tested by the standard cubic feet at the government mint.

The company have not fully decided as to the price to be charged to consumers, but they are desirous of putting it down to the very lowest possible figure, so as to place the convenience of gas within the reach of all

In summing up this brief account of the Winona Gaslight Company, great credit is due to Mr. Thos. E. Bennett for having inaugurated the project and pushing it forward to a successful termination. To his forethought and business enterprise Winona is chiefly indebted for her gas works at the present time. In fine Winona is congratulating herself on the important event of the establishment of a gas works. She may also rejoice that the company is composed of citizens who have ever manifested a true and hearty interest in everything which tends to her welfare.

THE NEW WORKS OF THE CITIZENS GAS-LIGHT COMPANY OF NEWARK.

We have been lately induced, by the fame of this Model Gas Works, recently erected and put in opration during the last winter by Mr. J. P. KENNEDY, of the Atlantic Dock Iron Works, to make the little trip to Newark, and inspect them throughout. After skimming across the broad green meadows, gazing at the interesting and picturesque trap elevation, so unromantically denominated "Snake Hill," possibly because the silvery Hackensack coils around and embraces it much after the fashion of a snake, and which one day shortly hence (when made accessible) will be one of the most charming sites in all this section—we quickly found ourselves at the Newark station of the Delaware Lackawanna and Western Rail Road, whence to the new works is but five minutes walk. A couple of hours were spent most pleasantly and profitably in "doing" the whole premises, the good fortune falling to our lot of having as a *Cicerone* the urbane and accomplished son of Mr KENNEDY, Mr. EDWARD KENNEDY, whose intelligent explanations made all the improvements, of arrangement and device, perfectly clear. It was our intention in this issue, to present an account of our observations in full detail, but not having been able to get it ready in time, it must go over to the next. We shall here but say that while the neatness, convenience, and even roominess of arrangement, have never been surpassed within our observation. there can be no dispute that in no case heretofore has there been erected a gas works of this capacity in nearly so *compact* a form. It may truly be called a model. —H. W.

NATURAL GAS.

The fact that a large and steady flow of gas had been obtained by boring into the earth at various points on the Lake Erie shore, induced the Buffalo Gas Company to put down a well in that city, in the expectation of reaching gas.

The work was begun on the first of February, and is now completed. The first vein of gas was struck at a depth of 318 feet, and the gas fissures gave out their contents at nearly regular distances of 20 feet thereafter. At the depth of 630 feet the salt water was thrown out of the well with such violence as to show there was a very strong impelling force beneath it. The water was then pumped out and the well was tested, when the gas began to flow freely. The tube, a two-inch one, was put in and the flow has been regular from that time in quantity sufficient to furnish fuel for a large manufacturing establishment.

At the gas house the natural gas did the work of the ordinary fuel for the furnaces, small quantities of coke being supplied in addition now and then. In the retort house its illuminating powers were tested through about twenty pipes. It did not work well through the ordinary burners; but these being removed and full vent allowed to it, it gave all the light necessary; though a clear, steady light is not essential for the work to be done there. The light is not bright and clear like that of coal gas, and showed a liability to disturbance by the action of the atmosphere.

The company intend to have the value of the gas thoroughly tested. and have engaged the services of Prof. Hadley to make a scientific investigation of the matter. The subterranean gas is found all the way from Buffalo to Cleveland.

At Painsville, Ohio, between Erie and Cleve-

land, a well 550 feet deep is yielding an enormous volume of gas. This well is located about two miles from the Lake.

ST. JOHN AND ROCKWELL'S NEW "DRY SCRUBBER."

On another page we are pleased to give a long, but interesting, and highly intelligent communication, upon these new plans and apparatus, of which our readers have had an account a month since. We ourselves have the subject in course of critical examination, and shall present our own views thereupon. H. W.

PORTLAND CEMENT.—The attention of Gas Companies is called to the advertisement of L. JAFFE, on this page, importer of the best brands of Portland Cement. The superiority of this cement is too well known to say anything about the advantages and savings in using this material for heavy hydraulic purposes. Brick tanks ought to be only built with mortar of Portland cement and sand, making a much stronger structure than could be made with the best domestic or Rosendale cement. In lining tanks with half an inch of Portland cement and fine sand, it makes a perfectly water tight reservoir.

We have in hand, from Messrs. MORRIS, TASKER & Co., an elegantly gotten up pamphlet, almost a book, which is for *gratuituous distribution*, comprising very voluminous tables, minutely calculated by their Gas Engineer, Mr. P. MUNZINGER, of the discharge of gas through pipes of $\frac{1}{8}$ inch to 72 inches, from 10 to 10,000 yards long, at from 1-10 inch to three feet pressures. They must be invaluable for reference, and save a great amount of figuring. Let all our readers send for them.

Answers to Correspondents.

E. R. P. of Ohio.—Hawley's Aubin Gas Meter is a good one, and we think as good a plan as any for small works By diluting your gas you can give a satisfactory light, with less liability to condensation in the pipes and mains, and consequent loss of illuminating power, and of course the cost will be less to your company.

J. H. of Mich.—We think if you were to try clay retorts you will be very averse to adopting anything else. They are endorsed by nearly all the prominent engineers, and are growing in favor every day.

L. R. P. of Ill.—The steam and water in a boiler are always at the same temperature under any pressure. The temperature of the steam and water will be 305° Fah., at a pressure of 60 lbs. on the square inch.

B. P. T. of Mass.—D. Van Nostrand, publisher at No. 27 Warren street can furnish you with a work on gasfitting.

P. B. S. of O.—To remove the crust of carbon from clay retorts take out plug from stand-pipe through lid of mouth piece, or leave a space open at bottom of lid to allow a current of cool air pass, which oxidizes and crumbles the carbon, which is renewed with the following charge. A bar is injurious.

D. E. L. of Ind.—Mr. Grafton's first clay retort was shaped like an ordinary oven. It was 5 feet wide, 18 inches high and 7 feet long. It was made in short lengths of 16 inches, luted together with fireclay.

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The best references given on these points. 244-6m

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Dear Sir: The Trays manufactured by you for our West Station were put in use in September last, and have *given perfect satisfaction.*

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The pressure thrown upon the retorts by contracted passages is very great, and were gauges used more frequently than they now are in many gas works, this fact of having *open Trays* would become more apparent to managers of gas works. The difference in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

The amount of gas purified, per bushel of lime used to this date, is six thousand five hundred and fifty-six (6,556) cubic feet.

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The RONDOUT AND KINGSTON GAS-LIGHT COMPANY being about to enlarge their Works, offer for sale their present Purifying, Working and Condensing Apparatus, with Station Meter, as follows: Washer 7 feet high, 20 inches diameter, with 6-inch inlet and outlet; six 12-inch Condensers, with 3-inch air pipes; four Purifying Boxes 5 feet diameter, with Covers and Centre Seal, in complete working order; all with 6-inch inlets and outlets. This apparatus is capable of washing, condensing and purifying 50,000 feet of gas per day. Station Meter made by SAMUEL DOWN, four feet by four feet, with clock and tell-tale.

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Cost 2c cents per bushel. One bushel for each square foot of Purifier sufficient. Rights to use for life of Patents, for daily makes of gas in thousands; under 35,000 $200; under 50,000, $400; under 100,000, $500; $250 additional for each additional 50,000 per day.

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Counsel, and Adviser

of INVENTORS, in all the CHEMICAL ARTS; for which his great general experience in these Arts, and his special experience inside the Patent Office, have qualified him to an unparalleled degree.

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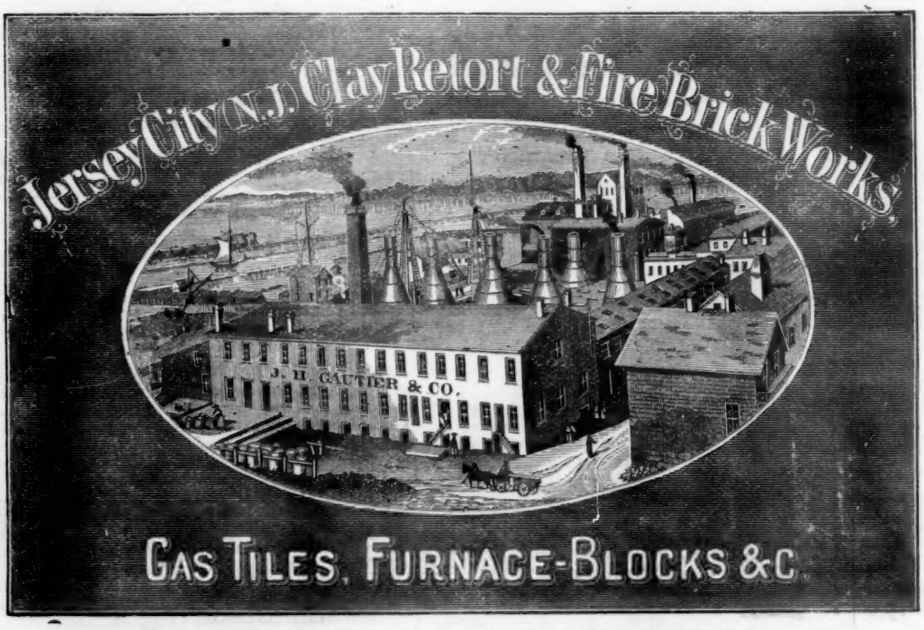

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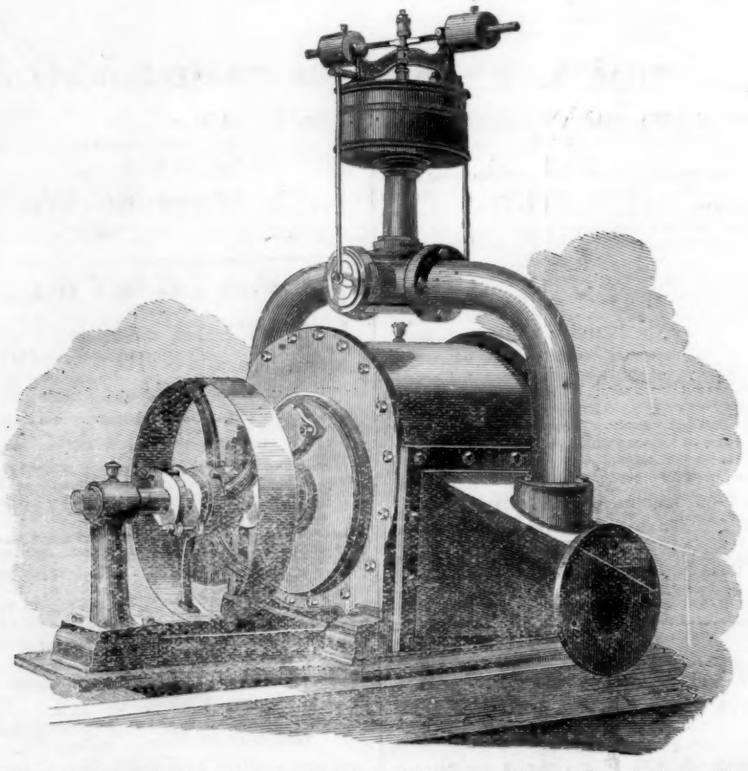
And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

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The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 35 per cent fuel. Address

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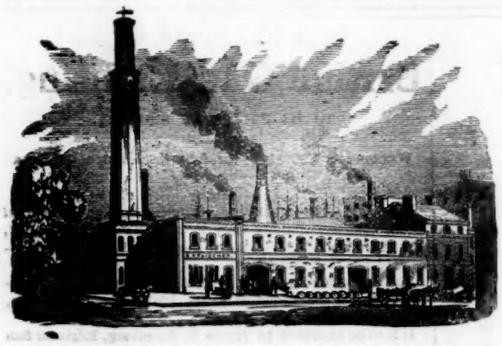

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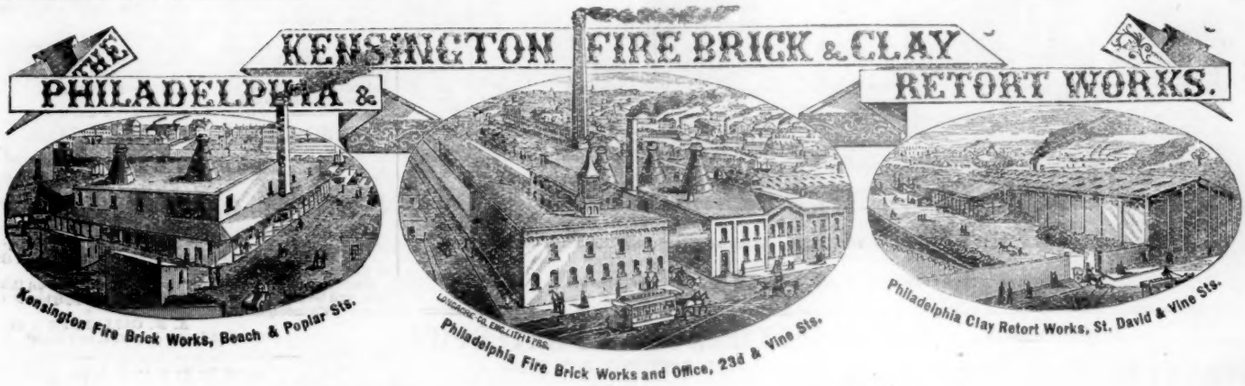
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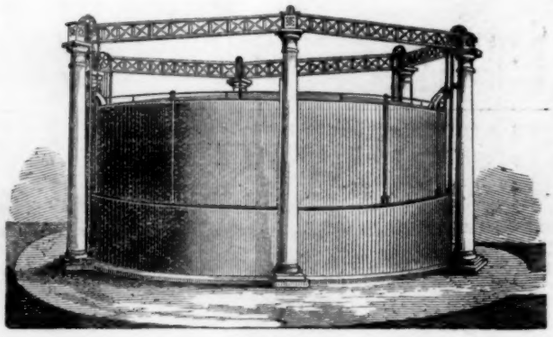

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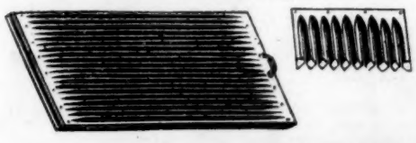

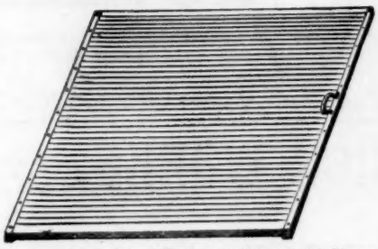

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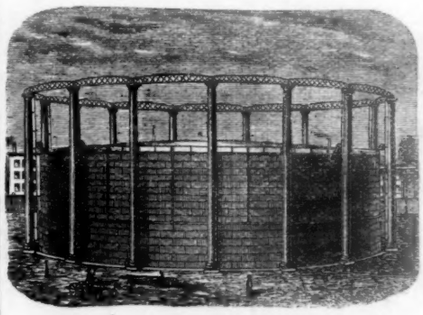

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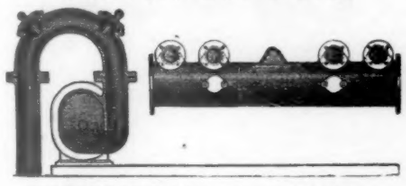

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Used in the Erection of Gas and Coal Oil Works.

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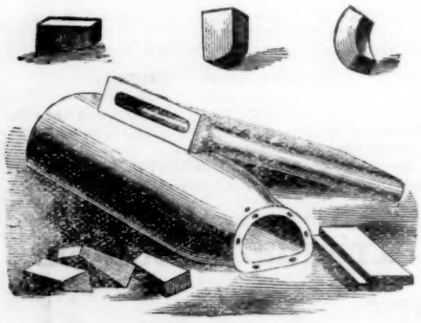

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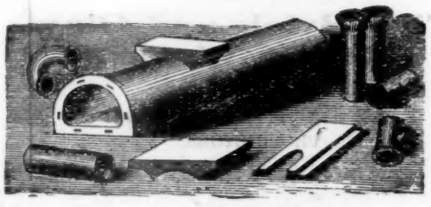

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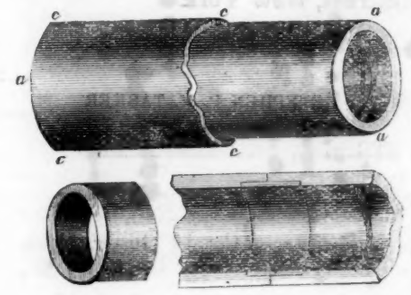

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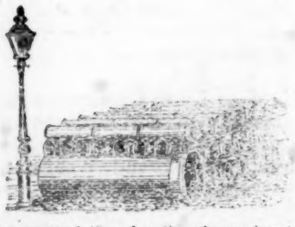

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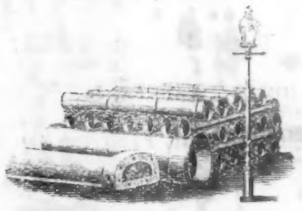

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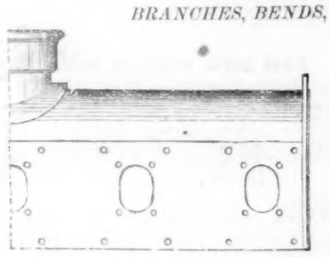

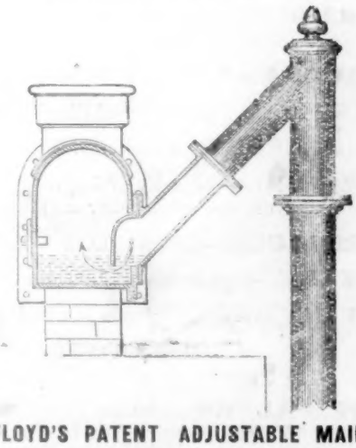

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By the removal of the front plate only the Main can be adopted to Settings of any number of Retorts desired. The Patent Main can be applied to the ordinary D shaped Main. It offers great facilities for cleaning, and is not liable to stoppage.

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